

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.



HUMAN NUTRITION RESEARCH DIVISION

organization and program

*Agricultural Research Service
U.S. Department of Agriculture*

The Human Nutrition Research Division is part of the Agricultural Research Service of the U.S. Department of Agriculture. Division headquarters and most laboratory facilities are located on the 12,000 acre site at Agricultural Research Center (ARC), Beltsville, Maryland. A laboratory for metabolic studies, primarily concerned with mineral nutrition, has recently been constructed on the campus of the University of North Dakota, Grand Forks, near the medical school.

The first Federal research program in human nutrition was begun by the De-

partment of Agriculture in 1894, and has continued to evolve through the years. The Human Nutrition Research Division, now the major nutrition research unit of the Department, conducts a research program to obtain information on the human requirements for nutrients and the ability of various foods to provide these nutrients. The goal is to provide a sound basis for dietary recommendations for normal individuals throughout their lives. This research program is supplemented by grants, contracts, and cooperative agreements with universities and private laboratories.

OFFICE OF THE DIVISION DIRECTOR

*Dr. Willis A. Gortner,
Director*

*Room 223, Building 308
Agricultural Research Center
Beltsville, Maryland 20705
Tel. 301-474-4800, Ext. 337*

*Dr. C. Edith Weir,
Assistant Director*

*Room 223, Building 308
Tel. 301-474-4800, Ext. 646*

*Dr. Leon L. Hopkins, Jr.,
Assistant to the Director
Room 226, Building 308
Tel. 301-474-4800, Ext. 339*

*Dr. Helen J. Souders,
Assistant to the Director
Room 114, Building 308
Tel. 301-474-4800, Ext. 645*

The office of the Director administers a broad program of basic and applied research. The research program includes—

- Establishing criteria for desirable diet patterns and determining which foods meet these needs through the study of human nutritional requirements for carbohydrates, proteins, lipids, vitamins, and minerals.

- Determining the functions and physiological utilization of nutrients in foods.

- Characterizing the forms, properties, biological availability, and nutritional usefulness of the various nutrients as they occur naturally in foods, and as they change through processing and preparation.

- Appraising the nutritional state and the response to various nutrients in the diet of selected population groups.

This office provides leadership and direction in the formulation and execution of policies and programs related to the Division's research program.



A scientist is checking the amount of insulin in blood.

970 C832-21

CARBOHYDRATE NUTRITION LABORATORY

*Dr. Leon L. Hopkins, Jr.,
Acting Chief*

Room 215, Building 307

Tel. 301-474-4800, Ext. 531

The Carbohydrate Nutrition Laboratory conducts a program to develop dietary recommendations regarding the

kind and level of carbohydrate as influenced by the metabolic characteristics of the individual, his mode of life, and his consumption of other nutrients. The Laboratory is also concerned with establishing food recommendations to meet the requirements for dietary carbohydrates. This work is carried out by two investigations groups—Food Carbohydrate Composition Investigations and Dietary Carbohydrate Requirements Investigations. The Human Nutrient Metabolism Investigations, although located within the Carbohydrate Nutrition Laboratory, does cooperative research with all four Laboratories.

Food Carbohydrate Composition Investigations

Building 307

Research is conducted to develop basic principles and data on the distribution, nature, properties and composition of carbohydrates in foods. This Investigations group searches for carbohydrate constituents that have physiological importance or which contribute toward the nutritive value of foods. Changes that may result from food production practices are evaluated to determine whether they affect the nutritional significance of the carbohydrate components. Coop-

erative research with other scientists is done to establish the biological usefulness of the forms of carbohydrates found in foods.

Dietary Carbohydrate Requirements Investigations

*Dr. David A. Trout, Head
Room 301A, Building 307
Tel. 301-474-4800, Ext. 554*

Research is conducted to determine the functions and roles of carbohydrates and the best levels in the diet. Also under study is whether patterns of carbohydrate consumption influence these factors. The

physiological mechanisms in the use of carbohydrates by the body or altered by dietary carbohydrates are analyzed. Another main area of research is the investigation of the nature of genetic influences on carbohydrate response and the role of endocrine functions in governing these responses. Processes related to lipogenesis are studied, particularly those in which carbohydrates play an influential role.

Current areas of study are—

- Enzyme regulation in lipogenesis.
- Hormonal status and response in the utilization of carbohydrates.

● The role of carbohydrates in influencing fat transport.

Human Nutrient Metabolism Investigations

*Dr. M. Isabel Irwin, Head
Room 216, Building 307
Tel. 301-474-4800, Ext. 434*

In addition to its own research, this investigations group does cooperative studies across the entire Division. A large part of the work is done under contracts and grants. Studies seek to determine the effects of nutrients on body processes



In human metabolism study, saliva is collected as an indicator of metabolic response.

BN37344

and to evaluate the biological usefulness to humans of the various forms of all classes of nutrients. Cooperative research is conducted to assess health benefits derived from control of types and amounts of the various nutrients in diets of individuals and to establish the most favorable dietary levels. New and improved methods for evaluating the nutritional state of individuals are developed.

Research includes—

- A review of the literature of human nutritional requirements.
- An investigation of saliva response to dietary carbohydrates and the possible

use of this biological fluid for analysis of nutritional status.

LIPID NUTRITION LABORATORY

*Dr. James M. Iacono, Chief
Room 126, Building 308
Tel. 301-474-4800, Ext. 204*

The Lipid Nutrition Laboratory conducts a program concerned with analyzing the lipid content of foods and determining the role of dietary fat in maintaining the well-being of the individual. This research is aimed at determining

requirements for dietary lipids and recommending foods to meet these requirements. Two laboratory groups carry out these investigations.

Food Lipid Composition Investigations

*Mr. Hal Slover, Head
Room 101A, Building 308
Tel. 301-474-4800, Ext. 689*

Research is concerned with determining the lipid composition of foods and identifying those lipid components that are important in nutrition. This



Lipid researchers use the mass spectrometer for the identification and structural determination of organic compounds.

970 C831-4

involves investigating the kinds of lipids in foods and analyzing the forms in which lipids occur. Studies are also conducted to determine the chemical reactions lipids might undergo in food processing and how lipids react with other food components. New methods for the determination of forms of lipids in natural, processed, and prepared foods are sought.

Current investigations involve—

- Structural analysis of triglycerides and unsaturated fatty acids found in fatty foods.
- Characterization of different forms of vitamin E occurring in foods.

- Study of tocopherols in wheat.
- Determination of physical properties of lipids, such as molecular conformation, and the association of cholesterol with itself and other lipids.

Dietary Lipid Requirements Investigations

*Dr. James M. Iacono,
Acting Head
Room 126, Building 308
Tel. 301-474-4800, Ext. 204*

Studies are conducted with the aim of establishing recommendations for dietary

lipid requirements in human nutrition. The metabolism of lipids by the body and possible metabolic alterations caused by dietary lipids are explored. Investigations are concerned with assessing the health benefits from control of types and amounts of lipids in the diet of persons with different types of heredity, using experimental models as well as human subjects. Scientists also study the effects of type and level of dietary lipids on body processes and structures.

Recent studies include—

- Investigation of the role of dietary fat in cholesterol metabolism.

- Establishment of the requirements for essential fatty acids and development of the means for evaluating whether these requirements have been met.

- Exploration of the role of heredity in affecting the body's response to dietary lipids, aiming to identify a specific metabolic difference responsible for different lipid utilization.

PROTEIN NUTRITION LABORATORY

*Dr. David A. Vaughan, Chief
Room 214, Building 308
Tel. 301-474-4800, Ext. 254*

The Protein Nutrition Laboratory is concerned with determining human dietary requirements for protein and amino acids and with recommending foods to meet these requirements. This involves characterizing the chemical nature, properties, and nutritional usefulness of food proteins, as well as identifying their

physiological mechanisms of utilization. Two investigations groups—Food Protein Composition Investigations and Dietary Protein Requirements Investigations—carry out these studies. The Histopathology Investigations group, though located within the Protein Nutrition Laboratory, carries out cooperative work with all four Laboratories.

Food Protein Composition Investigations

*Dr. C. E. Bodwell, Head
Room 314, Building 308
Tel. 301-474-4800, Ext. 239*

This investigations unit conducts research in the distribution, nature, properties, and composition of proteins in foods. Different processing methods are studied to evaluate whether they alter the nutritional availability of amino acids. Factors that cause amino acids to become nutritionally unavailable and the extent of this change are explored. This involves studies of protein structure and protein-carbohydrate interactions. Methods are also developed to chemically identify nutritionally available and non-available amino acids in foods.

Current projects include—

- Isolation and characterization of

trypsin inhibitors in foods.

- Investigation of the effects of cooking on the susceptibility of foods to enzymatic digestion.

- Study of the structure of subunits of proteins representative of plant and animal sources.

Dietary Protein Requirements Investigations

*Dr. David A. Vaughan, Head
Room 214, Building 308
Tel. 301-474-4800, Ext. 254*

Investigations are conducted to deter-

mine the effects of type and level of protein on body processes as the human organism is changed by growth, diet, age, reproduction, and other stress. Experiments are conducted to assess health benefits derived from the control of types and amounts of protein in the diet of subjects with different types of heredity. Research is done to establish the physiological mechanisms in use of proteins by the body or altered by dietary proteins. New and improved methods are sought for evaluating the nutritional state of individuals with respect to proteins. Work is carried out to determine effects of protein-carbohydrate interaction.

Research studies involve—

- Studying the physical and chemical characteristics of collagen as a possible index of nutritional state and age.

- Developing more exact methods for evaluating amino acid and protein requirements.

- Analyzing the relative values of protein food supplements.

- Studying effects of levels of protein and of protein-carbohydrate interaction on growth, longevity, and organ function.

The amino acid analyzer aids scientists in determining human amino acid requirements.

970 C832-8

Far right:
In histopathology, the electron microscope is used to study tissue changes rising from various diets.

970 C832-6





Histopathology Investigations

Building 308

In addition to carrying out their own program, this investigations group conducts research that is cooperative with and an extension of research in each of the four Laboratories. Morphological changes are analyzed in laboratory animals of different age groups on various diets. Detailed histological and histochemical examinations are made of selected tissues to define the nature and

extent of deviations from normal tissues. The electron microscope is used to study and analyze tissue changes at the ultramicroscopic level. Current research includes studies of the response in different strains of rats to diets differing in level of protein and in kind of carbohydrate. Cooperative research is conducted to determine the overall effects of diet and the relation of morphological and histological response to biochemical, physiological, and enzymatic changes.

VITAMIN AND MINERAL NUTRITION LABORATORY

*Dr. Walter Mertz, Chief
Room 301A, Building 308
Tel. 301-474-4800, Ext. 245*

Investigations in the Vitamin and Mineral Nutrition Laboratory are concerned with determining the dietary patterns that will sufficiently meet human needs for vitamins and minerals. This involves determining the essential vitamins and minerals, knowing the human requirements for them, and ascertaining in what foods they occur. Research into these

areas is conducted by two laboratory groups.

Food Vitamin and Mineral Composition Investigations

*Dr. Edward Toepfer, Head
Room 326A, Building 308
Tel. 301-474-4800, Ext. 262*

Assessment is made of the contents of vitamins and minerals in foods and their biological usefulness. Studies are conducted to determine the distribution, nature, properties, and composition of vitamins and minerals in foods. New and

improved methods are sought for the analysis of these constituents. The effect of processing on the biological availability to man of vitamins and minerals is evaluated.

Research in these areas involves—

- Studies to determine the effects of cooking and processing on carotenoid pigments of vegetables.
- Characterization of iron in foods to establish the different forms of iron in foods and their availability.
- Exploration of the distribution and concentration of a chromium-containing

glucose tolerance factor in biological materials.

Dietary Vitamin and Mineral Requirements Investigations

*Dr. Walter Mertz, Acting Head
Room 301A, Building 308
Tel. 301-474-4800, Ext. 245*

Research is conducted to determine the essential vitamins and minerals and their requirements for human nutrition. Physiological mechanisms of action of these nutrients are studied. Work is carried out to determine the effects of



Trace element deficiency studies are conducted in the controlled environment of isolators.

type and level of dietary vitamins and minerals on body processes and structures. The investigation program is also studying trace elements (not known to be essential nutrients) to see if they have biological significance. This latter study is conducted at the Human Nutrition Laboratory, Grand Forks, North Dakota. This facility contains a dust-free animal room as well as various chemical laboratories.

Studies under investigation include—

- Determination and identification of new essential trace elements and mode of action.

- Investigation of the biological importance of vitamin E and selenium.

METABOLIC WARD

The Human Nutrition Laboratory, Grand Forks, North Dakota, houses a nine-bed metabolic ward for human nutrition research studies. This ward is available for use by all Laboratories within the Human Nutrition Research Division, as well as by outside collaborators.

OUTSIDE RESEARCH

Specific research proposals are in-

vited from university and research institute scientists. A limited number of proposals are selected each year and are funded under grants or contracts. Selection is based on program needs and on qualification of the proposed investigator and quality of the institution's research facilities.

Research proposals from foreign scientists are funded through Public Law 480. These proposals include basic nutrition studies and applied studies on foods likely to be found in an American diet.

Cooperative efforts between Division scientists and scientists from domestic and foreign institutions are

accomplished through cooperative arrangements.

Research opportunities are available for non-government scientists to work in Human Nutrition Research Division laboratories while on sabbatical leave. Also, several post-doctoral research associateships are available each year, administered through the National Academy of Sciences.

Several programs enable Division scientists to work in outside laboratories.

LOCATION

The Human Nutrition Research Division is located in the north building

(Bldg. 308) and the central building (Bldg. 307) at the National Agricultural Research Center, Beltsville, Maryland. The Center lies between the Baltimore-Washington Parkway and U.S. Route 1, about 15 miles northeast of Washington, D.C. (See map, back cover.)

Three airports serve the Washington, D.C. area: National (Washington, D.C.); Friendship (Baltimore, Md.); and Dulles (Chantilly, Va.).

Bus connections: Greyhound buses stop in Beltsville at the intersection of U.S. Route 1 and Powder Mill Road, about 2 miles from the Human Nutrition Research Division. Or, a Greyhound bus

leaves from the downtown Washington Greyhound terminal for Beltsville, Center building 307, at 6:55 a.m. and returns to Washington at 4:35 p.m. daily.





NATIONAL AGRICULTURAL LIBRARY



1022459142

AR
CENTER

Issued August 1971